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ABSTRACT

The paper--half of which consists of appended charts, data, and the like--reports on two studies investigating the listening preferences of normal and Down's syndrome infants for recordings of adult speech to a normal 18 month old in contrast to adult speech to another adult. In the first study, Ss in both groups were 12, 15, and 18 months of age. The normal 18 month old was the only S to show a statistically significant preference for either speech sample, and he preferred the speech addressed to the 18 month old. Implications are discussed concerning the relationship between selective listening and environmental language input. In the second study, groups of 12 month old children were to be studied longitudinally for 6 months, along with a group of Down's syndrome children matched with the normal infants for language level. The study was not completed due to the difficulty in finding appropriate Ss. This difficulty is discussed, and a method for avoiding it in future research is recommended. (Author/DLS)

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University of Minnesota

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Abstract

A number of researchers have found that speech addressed to language learning children differs considerably from speech addressed to older children and adults. It has been argued that this modification of speech addressed to language learning children in some way minimizes the child's problem of acquiring the language of his community. The studies reported here measured the listening preferences of normal and Down's syndrome children for recordings of adult speech to a normal 18 month old in contrast to adult speech to another adult.

In the first study, children in both groups were 12, 15, and 18 months of age. The normal 18 month old was the only child to show a statistically significant preference for either speech sample, and he preferred the speech to an an 18 month old. Implications are discussed concerning the relationship between selective listening and environmental language input.

In the second study, groups of 12 month old children were to be studied longitudinally for six month, along with a group of Down's syndrome children matched with the normal infants for language level. The study was not completed due to the difficulty in finding appropriate subjects. This difficulty is duscussed, and a method for avoiding this difficulty in future research is recommended.

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Normal and Down's Syndrome Children's Listening Preferences for Maternal Speech

James McCaul and James Turnure

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A respectable number of studies have shown that speech addressed to normal language learning children differs from speech addressed to adults and older children (Brown & Belluzi, 1964; Slobin, 1969; Snow, 1972a; Broen, 1973; Nelson, 1973; Phillips, 1973; Berko, 1973; Baldwin & Baldwin, 1973; Holzman, 1974; Moerk, 1974, 1975; Ling & Ling, 1974; Fraser & Roberts, 1975; Glazner & Dodd, 1975; Lord, 1975; Longhurst & Stepanich, 1975; Seitz & Stewart, 1975; Newport, 1976). Reviewing many of these studies, Vorster (1974) concluded that among the most reliable differences are shorter length of utterance, slower rate of speech, fewer tenses, less vocabulary diversity, and lower frequency of complex sentences. It has also been shown that these modifications of speech change as the child's linguistic capabilities progressively develop (Broen, 1972; Snow, 1972a; Phillips, 1973; Baldwin & Baldwin, 1973; Nelson, 1973; Fraser & Roberts, 1975; Moerk, 1974, 1975; Glazner & Dodd, 1975; Lord, 1975; Longhurst & Stepanich, 1975; Seitz & Stewart, 1975). Furthermore, this phenomenon does not appear to be restricted to the occidental cultures as it has been found in a number of other cultures (Ferguson, 1964; Kelmar, 1964; Blount, 1971, 1972; Omar, 1973). The modification of speech addressed to language learning children has proved to be a remarkably reliable phenomenon, and it has been widely assumed that this modification in

some way minimizes the child's problems of acquiring the language of his particular community.

Understandably, several investigators have questioned whether mentally retarded children are exposed to equivalent modifications in maternal speech. Kogan, Winberger, and Bobbitt (1969), Marshall, Hegrenes, and Goldstein (1973), and Buium, Rynders, and Turnure (1974) compared maternal speech to normal and to retarded children matched for chronological age (CA). The results of these three studies indicated that maternal speech to retarded children is generally less complex, raising the possibility that these children are exposed to a restricted language environment. This possibility has been used by a number of authors to justify intervention in the language environments of mentally retarded children (e.g. Dolley, 1974; Seitz, 1975; Mahoney, 1975; Mahoney & Seely, 1976; Mitchell, 1976).

However, interpreting differences in maternal speech to CA matched normal and retarded children as evidence of the restricted language environments of retarded children may be questionable. Matching retarded and normal children from CA yields groups that are at different levels of language development. When interpreting differences in maternal speech to normal children at different levels of language development, one usually considers tht since mothers apparently adjust their speech to their child listeners, maternal speech scores across mothers whose children differ in language ability are not comparable (Newport, Gleitman, & Gleitman, 1975). It is sensible to conclude then that maternal speech scores across mothers of CA matched normal and retarded children are likewise not comparable.

Rondal (1978) controlled for level of language development by matching groups of Down syndrome and normal children on three successive levels of mean length of utterance (MLV). Maternal speech was analyzed using 20 measures related to its output-numerial, lexical, syntactical, semantic-structured, semantic-pragmatic, and language teaching aspects. None of the comparisons yielded significant differences within any of the three language levels, although clear and significant differences were obtained across MLU levels.

It would appear then that the relationship between maternal speech and child's speech in the course of language acquisition is the same for Down syndrome children and normal children. However, MLU is a measure of expressed speech, and matching for MLU does not necessarily control for differences in receptive ability, which may in fact be a more important factor in determining the appropriateness of a particular language environment. The appropriateness of a particular language environment cannot be determined solely by describing the language environment available to the child. One must also consider the child's ability to gather and process information from that particular environment (Synder & McLean, 1977). It is the degree of match between the child's gathering and processing abilities and the information available that forms the basis for juding the appropriateness of a particular language environment for a particular child.

In this regard, it is interesting to note that in Rondal's study, when Down syndrome and normal children were matched for MLU, there were differences in mental age (MA) increasingly favoring the Down syndrome children at each higher level of MLU, suggesting that the general

cognitive level of the Down syndrome children was higher than that of the normal children despite their equivalence on a measure of expressive language. It is possible then that the information gathering and processing abilities of the Down syndrome children in Rondal's study were more highly developed than their MLU matched counterparts. If this were true, the relationship between maternal speech and child listener would indeed by different for the two groups, for even though the maternal speech to the two groups of children was found to be the same, differences in the gathering or processing of that speech may well affect its availability for use in solving the problems of language acquisition. Before judgements are made about the appropriateness of children's language environments, we need to know a great deal more about the relationship between speaker and listener in the interaction between children and thier language environments. Specifically, it may be helpful to know how well the observed changes in speech addressed to the child correlate with the child's abilities to gather and process that speech.

One approach to this problem is to examine one information gathering strategy, selective listening, which has been posited as an important language acquisition strategy (Synder & McLean, 1977). Newport, Gleitman, and Gleitman (1977) have also suggested that the child has the means for restricting and organizing incoming linguistic data by filtering out some kinds of input and selectively listening for others. We may begin to establish some basis for juding the appropriateness of particular language environments by investigating the selective listening preferences of children for certain aspects of their language environments.

A comparison of these preferences with aspects of the child's particular language environment may provide an estimate of the appropriateness of that environment. Furthermore, any demonstration of selective listening preferences which correspond to characteristics of modified maternal speech lends support to the idea that modified maternal speech indeed influences development in the language learning child by at least showing that the child is receptively tuned to such modifications. Although this idea is generally assumed, there is little empirical evidence to support it so far.

The first step in this approach should be to establish some reliable measure of the child's response to a variety of language inputs, especially a measure of selective listening preferences. Some evidence is already available concerning the responses of normal children to aspects of the speech addressed to them. C. Turnure (1971) found a strong but nonsignificant trend for nine month old infants to show greater motor quieting when listening to their mother's natural voice than when listening to two distorted versions of her voice. Spring (1974) recorded one mother's speech to her infant and her speech to an adult. Most, but not all, of the 12 month old infants studied showed a listening preference for the taped speech to infants over a 20 minute session. Friedlander (1968) placed an apparatus called PLAYTEST in the homes of several infants which allowed them to choose between two different taped selections. The frequency and duration of their responses were recorded. One 12 month old infant preferred to listen to a stranger speaking in a voice with bright intonation when this voice was paired with his own mother speaking in a flat monotone. A 14 month old infant showed no preference for

either of these selections for several days, and then suddenly showed an enormous preference for his mother's monotone voice. Another infant demonstrated a clear preference for his mother's voice with bright intonation and familiar vocabulary when it was paired with a stranger's voice speaking with flat intonation and unfamiliar vocabulary. He also clearly preferred his mother's voice with flat intonation and unfamiliar vocabulary when paired with the stranger speaking with bright intonation and familiar vocabulary. When offered the choice between his mother's voice on both these modes, he first showed a clear preference for his mother's voice in the bright intonation and familiar vocabulary mode, and then shifted significantly to a preference for the other mode. Infants in Friedlander's studies have also shown crossover when listening to low and high redundancy messages, initially preferring high redundancy and later shifting to low redundancy. These crossovers from familiar to unfamiliar inputs may prove to be important idices of the young child's exploration of his language environment.

This preliminary evidence indicates that very young children do selectively respond to aspects of the speech addressed to them, that the patterns of their responses may change over the course of normal development, and that these selective responses can be measured. However, there is a gap in this evidence concerning the effects of the specific changes in child directed speech noted earlier. Other than Spring (1974), the only study to use these changes as an independent variable was Snow (1972b). Observers noted the attention of two and three year olds to pictures while listening to a story read first in adult speech and then in modified speech. The speech was modified

according to Snow's (1972a) earlier findings. She found that the children were more attentive during the modified recording of the story.

The purpose of the studies reported here was to examine the selective listening preferences of normal and Down syndrome children for two different samples of adult female speech: 1) adults conversational speech and 2) modified speech to a normal 18 month old. In Study 1, the null hypotheses were: 1) there would be no significant individual listening preferences; 2) there would be no significant difference between the listening preferences of the two groups. In Study 2, the null hypotheses were: 1) there would be no significant individual or within group listening preferences; 2) individual and within group listeing preferences would not change significantly over time; 3) there would be no significant differences between the listening preferences of groups; 4) there would be no significant differences between the number and form of the observed changes in the listening preferences of the groups over time.

STUDY 1

Method

Subjects

The subjects of the first study were three infants with Down syndrome and three non-delayed infants. All of the Down syndrome infants were reported to be Trisomy 21's. The infants all lived in the Minneapolis-St. Paul area. The families of the Down syndrome infants all participated in the same early intervention program. All subjects were males since Kagan (1971) found sex differences in the discrimination of high meaning versus low meaning passages as measured by extent of

vocalization following the passage. Friedlander (1970) also reported sex differences in the rate at which stable response patterns and selective crossover effects emerged when studying selective listening preferences. In order to participate in the study, the infants could not have any debilitating heart condition, obvious sensory impairment, or more generally any medical condition (other than Down syndrome) which might seriously limit their development.

Each Down syndrome infant was matched with a single non-delayed infant for CA. The ages of the three pairs of infants were 12, 15, and 18 months. All infants were within 2 weeks of their age matched peers. In addition, the mothers of all infants were matched on the following criteria: ethnic group (Caucasian), familial monolingualism, familial structure (both husand and wife living at home), mother free of any major sensory handicap, maternal intelligence not obviously outside the normal range, and socio-economic status (the infants selected for the study were drawn from middle class families). One further selection criterion was the infant's ability to selectively respond using the equipment provided.

Apparatus

The test apparatus for both studies consisted of components of a PLAYTEST system. PLAYTEST is a portable instrument system for conducting studies of young children's listening preferences for controlled audio feedback in natural environments (Friedlander, 1966, 1967). The components of the system used in these studies were two large knob manipularda that were attached to a playpen, a 20282 PLAYTEST control unit, and two Wollensak 2540 AV remote control cassette recorders.

The knob manipularda were transparent plastic cylinders, 2.5 inches in diameter and 5 inches long. These cylinders projected into the playpen at a height of 16 inches above the pad and 26 inches apart. The infant could handle the cylinders when in a seated, kneeling, or standing position, but he could not reach both cylinders at the same time. Each cylinder was attached to an omnidirectional switch in a small enclosed box mounted on the outside of the playpen. When the infant handled either of the cylinders with a force greater than two ounces in any direction, one of the playback recorders was activated and the tape began. The onset of the tape was instantaneous with the onset of a response, and the duration of the tape was simultaneous with the duration of the response. The dynamic voice properties of the recordings played through the high output speakers in the Wollensak recorders could be characterized as "good to excellent." Recordings were made using a Wollensak 2540 AV recorder and a low impedance dynamic wide rnage microphone placed in a stationary position.

The 20282 PLAYTEST control unit automatically registered the frequency and duration of responses on both manipularda, and the accumulated numerical summaries of these data. With a periodic time signal the unit also recorded the length of each play session. The control unit included two Cramer running time meters for accumulating response durations, two Sodeco impulse counters for accumulating response frequencies, and a third Sodeco impulse counter for recording the frequency of the periodic time signal.

Procedure

The components of the PLAYTEST equipment were placed in the homes of each infant for five days. The equipment was located in such a way as to minimize interference with normal traffic patterns within each home. Mothers were instructed to turn the equipment on by moving a single switch when the infant was placed in the playpen, and to turn it off when the infant was removed. Each of these play periods during which the infant remained in the playpen was termed a session. Following each session mothers were asked to record the numerical summaries appearing on the control unit. Simple data summary sheets were provided in notebook form for this purpose. In order to minimize environmental auditory distractions, families were asked to turn off a T.V., radio, or record player during each session.

The number of sessions and the duration of each session was determined primarily by the convenience and schedule of each mother, although some general guidelines were given. Mothers were asked not to let an individual session extend for more than 20 minutes, and they were told that three sessions per day would be sufficient. This flexibility was allowed in order to ascertain the number of sessions and session duration that could feasibly be asked of mothers and infants in study 2. However, this flexibility made it impossible to follow a rigid schedule for counterbalancing the position of the two manipulanda. In order to minimize the effects of any potential position preference, the two manipulanda and their corresponding tape recordings were alternated between sessions so that the number of sessions with the manipulanda in alternated positions was approximately equal.

In order to verify each infant's ability to demonstrate a preference using the equipment provided, two initial sessions were administered during which the choice was between taped silence, or no auditory feedback, and a taped selection of bright, rhythmic, instrumental music. The positions of the manipulanda were alternated between sessions.

Once the infant demonstrated the ability to show a preference, the experimental sessions began. During these sessions, the choices available to the infant were taped adult female speech to an 18 month old, and taped adult female speech to another adult. Transcripts of these tapes are presented in Appendix 1.

Broen (1972) investigated the language environment of young children, and during one phase of her study she recorded mothers speaking to their children in a free play situation, and the same mothers speaking to an adult. Tape recordings and transcripts of these conversations were obtained for the present study. One mother's speech samples to her 18 month old child and to an adult were selected as models for the taped speech choices in study 1 and study 2. The actual tapes could not be used since it proved impossible to successfully delete the voices of the child and the other adult. It was thought necessary to delete the voices of the second parties so as to avoid confusion in the subjects (especially the older infants), and to "purify" the stimulus materials.

The problem of deletion was resolved by having an assistant listen to the tapes and study the transcripts. Particular attention was given to the cadence and intonation of the speech. After a number of practice sessions the assistant was finally able to imitate the speech of the mother on the tapes, and a recording was made of her readings. The assistant was a stranger to all the infant subjects.

Both taped messages, speech to an 18 month old and speech to an adult, were identical in length. They were 3 minutes 50 seconds long and were recorded repeatedly on one side of a 90 minute cassette. This was done so that the taped speech would always be available to the infants during the sessions, and so that the mothers would not have to rewind the tapes.

Although the taped speech samples were identical in length, they differed on a number of important dimensions. Measures of some of these differences are presented in Table 1.

TABLE 1

Measure	Speech to: 18 month old	: Adult
Total words	450	851
Rate of speech (words per minute)	117	222
Disfluencies per 100 words	.2	2.6
Vocabulary diversity (type-token ratio)	.530	.625
% of sentence boundaries that were followed by a pause	100	31.8

Results

Since Friedlander (1966) has shown response duration to be a more sensitive indicator of selective listening preferences than response frequency, response duration was chosen as the measure to be used in the initial sessions to determine if the infants could demonstrate a selective [redacted] listening preference. Selectivity was defined as the ratio of the time spent listening to taped music over the

total time spent listening to both music and silence. The length of each of the two sessions provided to infants ranged from 10 to 13 minutes. The selectivity measured in each of the two sessions was averaged into one selectivity ratio for each infant. Table 2 presents each infant's selectivity score expressed in a percentage.

TABLE 2

Percentage of total listening time spent listening to music

Age	Normal	Down Syndrome
12	.91	.90
15	.93	.93
18	.92	.92

In addition to selectivity, it is also important to note how actively engaged the infants were in their listening. One way to measure this is to compare the time spent listening to both tapes with the total session time. In other words, of the time he could of spent listening, how much of that time did the infant actually spend listening. This data is presented in Table 3.

TABLE 3

Percentage of session time spend listening

Age	Normal	Down Syndrome
12	.42	.44
15	.45	.60
18	.90	.34

One further refinement of this analysis of how actively engaged the infants were in listening is to examine how long the infants listened each time they turned a tape on. Table 4 shows the average duration of responses to music and to silence for each infant.

TABLE 4

Average duration per response in seconds

Age	Normal		Down Syndrome	
	Music	Silence	Music	Silence
12	2.5	1.4	2.6	1.3
15	1.5	.9	3.8	3.2
18	9.5	2.2	4.3	1.4

In that phase of study 1 during which the infants were able to select between the two taped speech samples, the number of sessions for each infant ranged from 9 to 14. The average number of sessions for an infant was 12. Each of these sessions varied in length. Median session length in minutes for each infant is presented in Table 5.

TABLE 5

Median session length in minutes

Age	Normal	Down Syndrome
12	18	17
15	22	6
18	6	9.5

Since the number of sessions and session length varied, total session time also varied. Table 6 shows the time during which each infant had the opportunity to select the available auditory stimuli.

TABLE 6

Total session time in minutes

Age	Normal	Down Syndrome
12	301	232
15	196	49
18	91	202

Selectivity has been defined as the percentage of total listening time spent listening to one particular stimulus choice. Table 7 presents each infant's selectivity for speech to an 18 month old.

TABLE 7

Selectivity for speech to an 18 month old

Age	Normal	Down Syndrome
12	.57	.54
15	.62	.57
18	.71	.57

Also of interest was how actively engaged the infants were in listening. One general measure discussed previously is the percentage of session time spent listening.

TABLE 8

Percentage of total session time spent listening

Age	Normal	Down Syndrome
12	.08	.03
15	.36	.29
18	.59	.10

Table 9 presents another measure of listening activity, that is, how long the infants listened each time they turned a tape on.

TABLE 9

Average duration per response in seconds

Age	Normal		Down Dyndrome	
	Speech to child	Speech to adult	Speech to child	Speech to adult
12	2.8	2.1	1.0	.9
15	3.5	2.9	5.9	3.9
18	7.4	3.1	4.2	3.2

The Wilcoxon Signed Rank Test, a distribution-free test for paired replicate analyses, was used to determine the significance of individual preferences. Table 10 presents the T^+ statistic values and probability values obtained using a two tailed Wilcoxon Signed rank test for each individual infant.

TABLE 10

Values of T^+ statistic and probability

with number of sessions in parantheses

Age	Normal		Down Syndrome	
	T^+	Probability	T^+	Probability
12	65(13)	p=.190	50(13)	p=.86
15	39(9)	p=.074	29(9)	p=.570
18	101(14)	p<.001*	53(14)	p=.999

The 18 month old normal infant was the only infant to show a significant preference for speech to an 18 month old, although the 15 month old normal infant approached significance at the .05 level.

Appendix 2 contains graphical representations of each infant's performance as cumulative response duration over time. Individual data summary sheets are included in Appendix 3.

Discussion

Although the infants varied in how actively they listened in the initial sessions, all the infants were able to demonstrate clear preferences for the taped music. However, when the contrast was between the two speech samples, only one showed a statistically significant preference, although the preference shown by the 15 month old normal infant approached significance. Clearly, the first experimental null hypothesis can be rejected since significant individual preferences were found. Furthermore, the fact that only the 18 month old normal infant significantly preferred speech to an 18 month old lends support

to the hypothesis that young children have the means of filtering and selecting certain auditory input from their language environments. The finding that only the 18 month old showed a significant preference also indicates that this selectivity may be developmental. That is, children at different developmental levels may prefer to select different aspects of their language environments. If this is true, as this study tentatively indicates, then investigators may have the means, and perhaps the method, to judge the appropriateness of particular language environments for particular children. It is interesting to note that this method is closely related to the method used by those that happen to be sensitive and competent caregivers, that is, adopting and accomodating patterns of interaction and stimulation to the child not on the basis of the caregiver's predilections, but rather on the needs and abilities expressed and demonstrated by the child.

While this first study yielded gratifyingly clear results that appear to support the hypothesis that language learning children have the ability to selectively listen for appropriately modified speech, the study should be regarded cautiously for several reasons. First, the small number of subjects limits generalization of the findings. Second, it could be argued that the variability in session length, number of sessions, and total session time may have confounded any performance comparisons between subjects. This argument presumes that those infants with longer exposure time would have had a greater opportunity to sample the inputs, process the information, and consequently demonstrate significant preferences. Following this line of reasoning, one would presume an experimental bias operating against

those infants with shorter exposure times, and likewise favoring those with longer exposure times. In spite of this reasonably presumed bias, the two infants who had the second and third shortest exposure time ranked first and second in productivity, or general listening activity. Of these two infants, one showed the only statistically significant preference, and the other was the only infant to approach significance at the .05 level. Furthermore, the infants who had greater exposure time were still not able to show a significant preference. Instead of weakening the validity of the results, this argument would appear to strengthen the results since the results were contrary to expectations derived from the argument. The finding that the results were contrary to this presumed experimental bias would appear to lend further support to the idea that selective listening is indeed an information gathering strategy available to children, and that this strategy can be used to preferentially select modified adult speech in contrast to adult conversational speech.

One might hypothesize from the results of Study 1 that the information a child prefers to select is correlated with certain aspects of that child's development. Specifically, the infants who showed the greatest listening productivity and preferences were those who appeared to be most closely matched to the speech sample they preferred. The normal 18 month old infant significantly preferred speech to an 18 month old. The subject nearest in developmental level to the 18 month old, the normal 15 month old, was the only infant to show a preference for speech to an 18 month old that approached significance. An extension of the present research could empirically test this hypothesis, and while the

possible confirmation of this hypothesis would leave unanswered the question of which particular characteristics of modified speech correlate with certain aspects of development, it would at least contribute to one solution of Hunt's (1961) "problem of the match."

Finally, while the Down dyndrome infants were able to show a significant listening preference for music versus silence using the equipment provided, they did not show a significant preference for either speech sample. A cautious interpretation of this finding would be simply that 12, 15, and 18 month old Down syndrome infants listen to adult speech to as normal 18 month old and adult conversational speech without preference. Another interpretation, based on the assumption that selective listening preference is one indicator of the appropriateness of a particular environmental language input, would be that speaking to a 12, 15, or 18 month old Down syndrome infant as one might speak to a normal 18 month old is no more appropriate than speaking to the same Down syndrome infant as one might speak to another adult. If one can further assume that speaking to an 18 month old Down syndrome infant as if he was an adult is not the most appropriate form of verbal communication with that infant, then it follows that speaking to an 18 month old Down syndrome infant as if he was an 18 month old normal infant may also not be the most appropriate form of verbal communication. It is not surprising then that Kogan, et al. (1969), Marshall, et al. (1973), and Buium, et al. (1974) found differences in maternal speech to CA matched groups of normal and Down syndrome children if the mothers in these studies were attempting an appropriate form of verbal communication with their own children. In fact, the finding that a

normal 18 month old significantly preferred listening to speech to a normal 18 month old, while his CA matched Down syndrome peer did not, may indicate the appropriateness of some of the differences in maternal speech to CA matched normal and Down syndrome children.

The focus of this research has been on the child's contribution in the adult-child interaction to the definition of the child's effective language environment. One aspect of this contribution, at least for normal children, appears to be an ability to use a specific information gathering strategy, that is, selective listening. While the adult produces a language environment for the child, the child may specify what parts of that environment are effective by selective listening. The results of Study 1 indicate that some normal children do listen selectively to speech, and thus may contribute to the definition of their language environment. However, the results of Study 1 did not establish that Down syndrome children have this same ability. Neither can it be said that Down syndrome infants do not have this ability since it can be argued that the speech samples used in Study 1 were not appropriate for the Down syndrome infants. The two groups of infants were at different levels of language development. Study 2 was designed to further investigate Down syndrome children's selective listening abilities by measuring normal and Down syndrom children's listening responses to identical inputs while controlling for differences in language development.

STUDY 2

The first study established a reliable method of measuring selective listening preferences in normal and Down syndrome infants, as well as

one normal infant's significant preference for adult speech to a normal 18 month old. The second study was to be a longitudinal investigation of normal and Down syndrome children's selective listening preferences for the same two speech samples used in Study 1. It was to be longitudinal, rather than cross sectional, in order to investigate changes in individual infant's listening preferences over time. It also differed from Study 1 in that it was to include groups of normal and Down syndrome infants matched for expressive language ability. Unfortunately, the second study was not completed. Nevertheless, a complete description of the method that was to be used in Study 2, along with a description of the difficulties which prevented its completion, will be presented.

Method

Subjects

The subjects specified for Study 2 were four 12 month old normal male infants, four 12 month old Down syndrome male infants, and four Down syndrome male children who were functioning at the 15 month level as measured on the expressive scale of the Sequenced Inventory of Communication Development (S.I.C.D.) (University of Washington). All other selection criteria were the same as in Study 1.

Apparatus

The equipment was the same as used in Study 1.

Procedure

The speech samples were the same as in Study 1. Mothers were to be given the same instructions as in Study 1 except for more rigid guidelines on session length and number of sessions in an attempt to more acequately control exposure time. The guidelines were derived from the

results of Study 1. Mothers would be asked to limit sessions to not less than five minutes and not more than 10 minutes. They were to be asked also to provide three sessions on each of the five days.

The Study would have begun when the normal infants were 12 months old, and ended when they were 18 months old. The equipment was to be placed in each infant's home for five days on four separate occassions over the six month span of the study. For the normal infants and their CA matched Down syndrome peers, the four occassions would have occurred when they were 12, 14, 16, and 18 months old: The occassions occurring at two month intervals for the language matched Down syndrome children as well. Prior to each occassion, the SICD was to be readministered to each normal and language matched Down syndrome infant. This would be done in order to have some measure of the closeness of match between the two groups on each occassion. The receptive scale of the SICD was also to be administered prior to each occassion so that any differences in selective listening preferences between the two groups could be related to possible differences in receptive abilities.

The experimental null hypotheses were 1) for individuals and within groups, there are no significant listening preferences, and listening preferences do not change significantly over time, and 2) for between groups, there are no significant differences between the listening preferences of groups, and there are no significant differences between the number and form of the observed changes in the listening preferences of groups over time.

Results and Discussion

It was hoped that the results of Study 2 would have replicated and extended the findings of Study 1. Specifically, Study 2 offered the possibilities of 1) investigating changes in individual and group listening preferences over time, 2) establishing Down syndrome children's selective listening preferences for modified speech, 3) comparing the similarities and differences of these preferences with normal children's preferences by controlling for differences in language development, and 4) comparing changes in these preferences over time between groups.

Unfortunately these possibilities were not realized because of the singular difficulty of obtaining appropriate subjects. There were two major reasons for this difficulty. The first was that it seems to be increasingly difficult to find Down syndrome infant subjects. This problem has been encountered by another researcher attempting to conduct a similar study in a different state (Mahoney, personal communication). The second reason involved the constraints imposed by the design of the study. While it was already difficult to find Down syndrome infant subjects, it proved impossible to find four 12 month old male Down syndrome infants and four Down syndrome male children who were all functioning at the 15 month level in expressive langauge. If these subjects were to participate in the Study as they were found, it may have been possible to complete this study over a period of several years. Instead, because of the time constraints imposed by the grant period, it was imperative that the groups be constituted at the same time in order to complete the data collection phase of the Study within the period of time allowed. This proved impossible. In order to effectively complete

the Study as designed, a grant period of at least two and a half years would be required.

It is truly unfortunate that this study was not completed because, based on the results of Study 1, it has the potential of contributing substantially to our knowledge of not only the process of successful language acquisition, but that of delayed language acquisition as well. As Synder and McLean (1977) have argued, the recognition that the child's acquisition strategies (e.g. selective listening) are in part responsible for the successful acquisition of language has direct implications for the understanding of delayed language acquisition. Specifically, delayed language acquisition could be analyzed in terms of the child's particular strategy deficiencies. Thus, language research and intervention could focus less on the products of language development and more on the processes critical to such development.

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Speech to an Adult

I've been talking to my friends about it since last week and we all think that the first ones learn faster because you spend more time with them / and the second ones get what they want/

well the first ones because they can just, like, we all say see what she wants and he takes care of her/ and he understands her/ you know so I don't think she has to communicate as much as he did/

yah I worked with him a lot more than I do with her/ probably because we're redoing our house now and we're busier/ and we're in more activities I think/ because we did spend a lot more time with him and I know I'm sometimes I feel sorta bad about it / but I spose I don't know the next year he's going to nursery school so then I know I'll do the same with her/ I'll you know try to teach her things in the kitchen/ because I taught him everything in the kitchen/ he can fry and egg by himself now and / he you know fixes his own breakfast and everything which / hecould do when he was two /

yeah he could scramble I was around you know I'm around / but he knows how to do things and he can stir things / course I spose you tend to baby the second one more / at least Boyd does / you know fathers spoil girls /

well we're just painting closets and we're gonna put two new ceilings in this week and /

well we're the down the living room we've ripped out and we're plastering that / we're putting up beams on that / and the dining room

we're putting up beams too and then new modling around you know on the top /

but two of the bedrooms are just being replaced with that wall board stuff you know /

yah / you hang it / and then we're just painting and papering and well we stripped all the wall paper off everything we're stripping wood work now / we've got a big buffet / it's about as big as that wall we're stripping paint off / five coats of paint / it's really work / and there's a antique door on the front that we've already stripped /

yay / well sort of like over at Carol's house they have buffets there / no they don't that there at Mrs. Smith's old house she had / yah a big you know one with glass doors in it / only everything was borken / so we /

yeah all the glass and a lot of these little pane things we had to replace everything these people lived just like pigs / this house was so bad / well the cupboards I spent two weeks on the cupboards along scraping moldy food out and everything / it was really bad / and then I stained the cupboards they'd never anything been done the kitchen had never even been painted / it was just plastered walls / but it was all greasy and just icky you know /

yeah it really worked on all the other walls well like even the closets we've had to paint / we're painting them all like three times / but you have to wash them so it's really a project / just nine rooms and we've done / well the bathroom's half done / and the kitchen's just about

done except we're stripping paint around the windows in the kitchen / then there's the breakfast room we haven't even started on / that's got seven windows and a door in / but we're not gonna strip that we're just gonna paint it and paper it / but it's sorta fun / we're having a good time / but it's real hard with the kids and we don't spend as much time you know as we should /

Yah cause there's really a lot well then they keep getting into things / she got into a can of paint the day after / in fact I think it was the day we were here / latex paint and just dumped it all over / and there's still glubs of it in her head / I couldn't get it all / Boyd you've got to get to her faster I said I took her right away and dumped her in the tub / and you can you know that's suppose to come out of clothes and it really doesn't /

yeah she was just a mess and then her door was really good in her bedroom it was a nice door / it had been replaced and she smeared white paint all over / so we'll have to take that remove that now too / we've just had a few little things like that my brother-in-law tipped tipped a whole tray of paint in the bathroom / we had a new toilet put in and he tipped it / we got all that up /

yeah that was no that was the high gloss / after a while our fiends either say you get hysterical because it's so bad or you just get depressed / and it is sorta funny really because we've got these garbage cans sitting around with our plaster in it and then I'm trying to train this dog cause we got a dog for Christmas /

Speech to an 18 Month Old

are you gonna go to sleep?

hm, are you tired?

uh um

nice dolly

did you finish your doughnut?

uh?

did you finish your doughnut?

no?

didn't you finish your doughnut?

were you playing with some toys?

you talk funny

you don't make sense at all

wanna see what's in the purse?

listen

you wanna look in there and see what's in there?

ah, looket

what's in there?

what is this?

wanna put her back?

close the purse

ok

rock, let's rock the dolly, rock

you wanna get down?

you wanna put her on the chair?

we aren't going any place

we're not gonna go anyplace right now

let's sit down with the dolly

ok?

should we put the d-

let's lay the dolly down

oh

let's fix the dolly's legs

wanna take her botties off?

you're such a messy thing

here

let's fix her legs

you just don't wanna set, do you?

put the dolly on the chair

put the dolly on the chair

oh this is falling off though

nice

see her eyes are closed?

she's going to sleep

say ni ni dolly

tell her good night

sit her up so her eyes are open

let her sit up

ok

where's the dolly's toes?

hm, where's the dolly's toes?

where are her toes?

are her toes in here?

can you find her toes?

hm?

what?

is that a little car?

here's a big truck

whoops, came apart

it's a Tonka truck

whoops

see that little thing's gotta fit in there like that

ok

yeah, comes apart, doesn't it?

you can fix it?

whoops, the truck fell over

you can put this car on top of here too and give it a ride

you push the truck

here

you push the truck

is the dolly ni ni?

come on

we're gonna stay here for just a minute and then we're gonna go

come on, push the truck

put the car inside here

can you do that?

now the car's going for a ride, looket

can you get the car out

is the car stuck?

try and get it out

see this part right here?

this part's gotta go in that hole

see that hole?

gotta go right in like that

now its fixed

yeah like that

but you have to do it yourself don't you

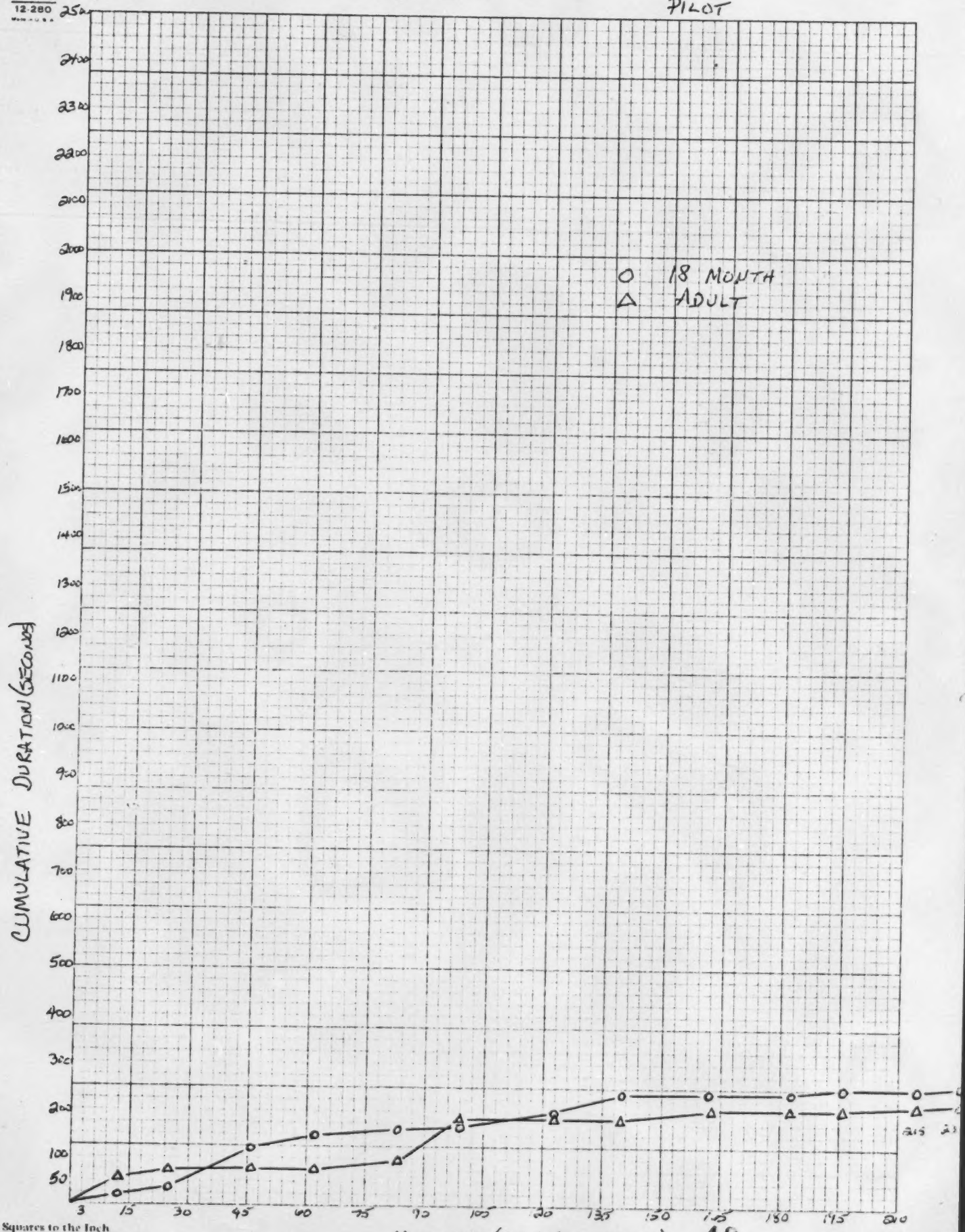
there you have it

thank you

want me to fix it?

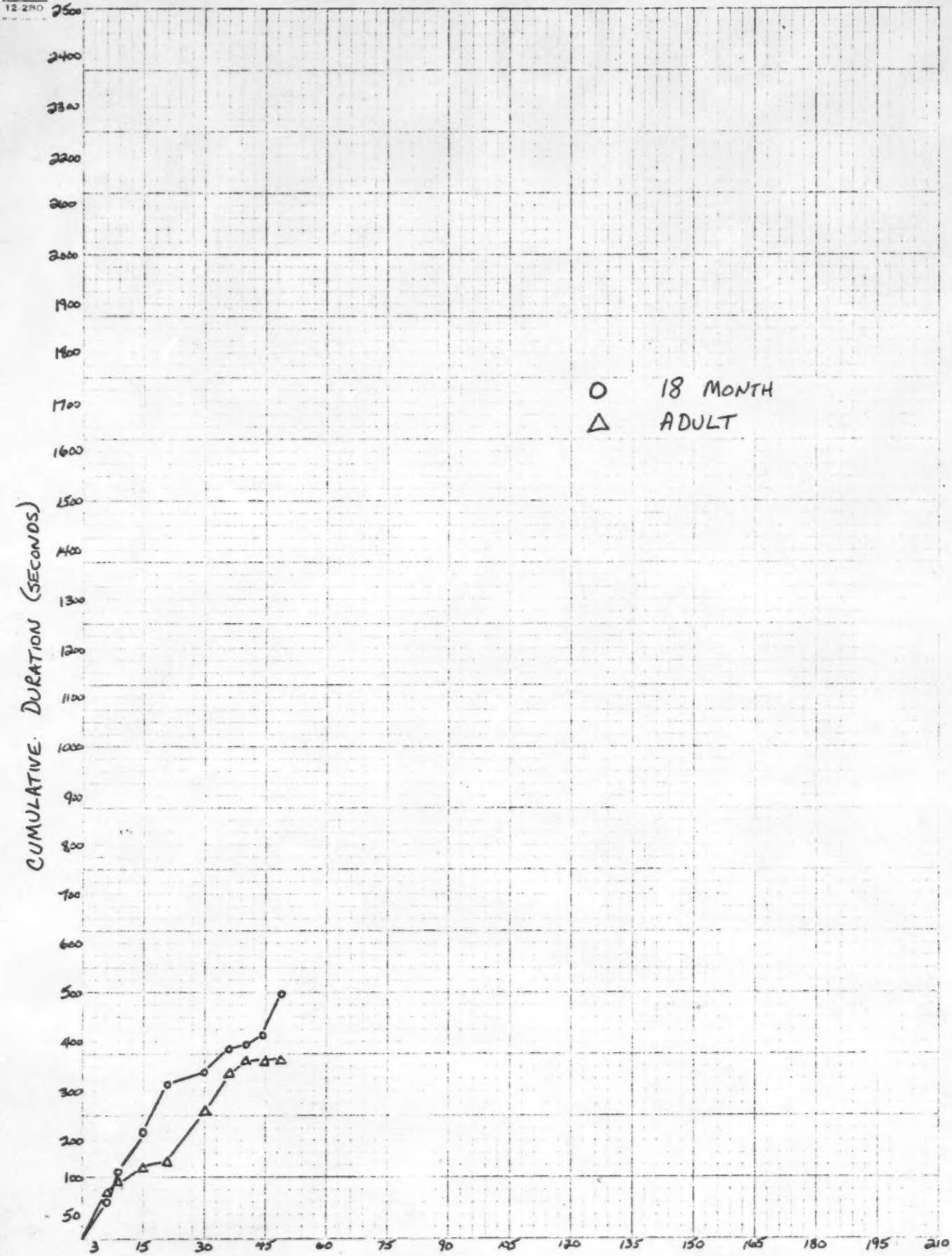
STUDY 1 APPENDIX 2 D-12

PILOT



STUDY 1

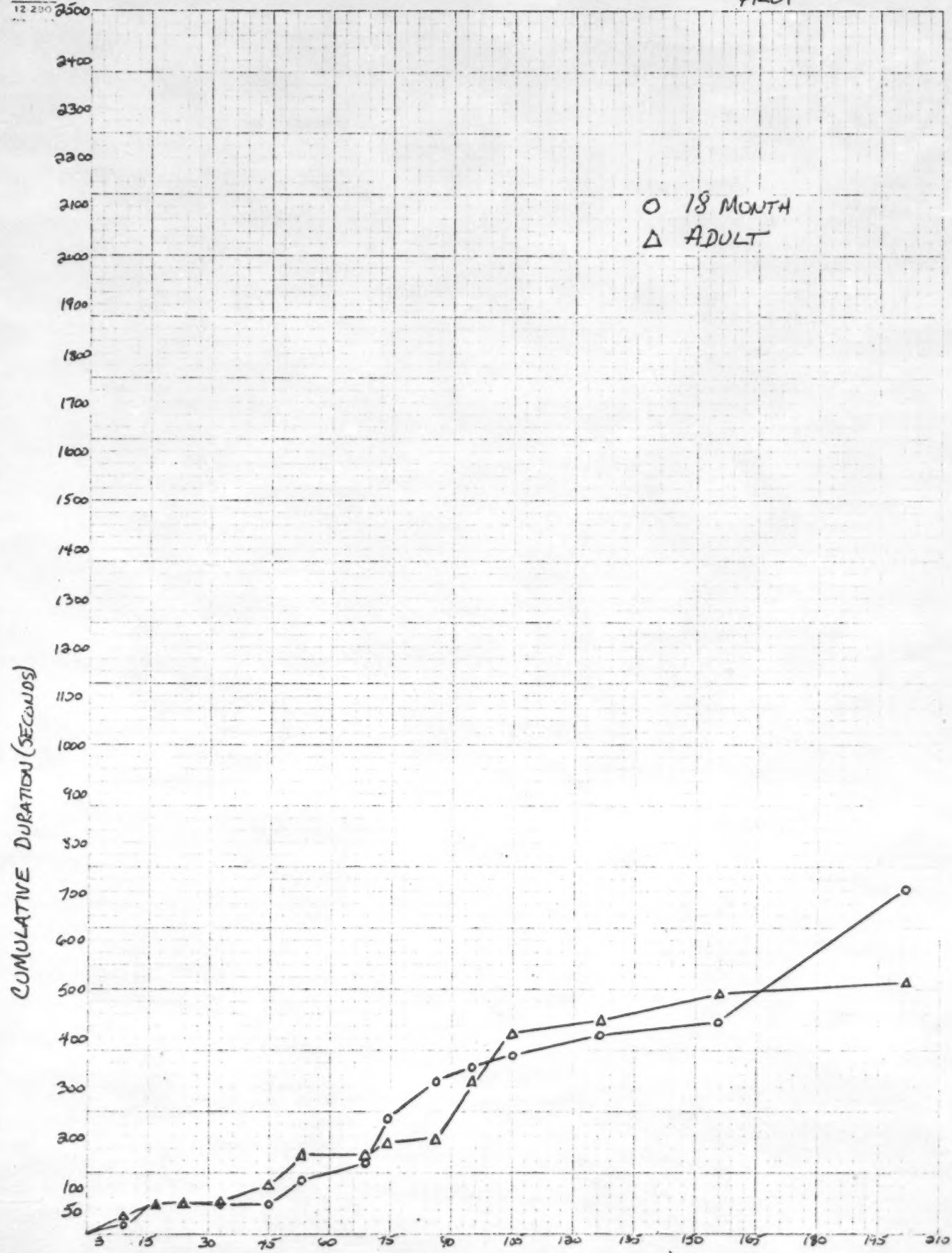
PILOT



10 Squares to the inch

STUDY 1

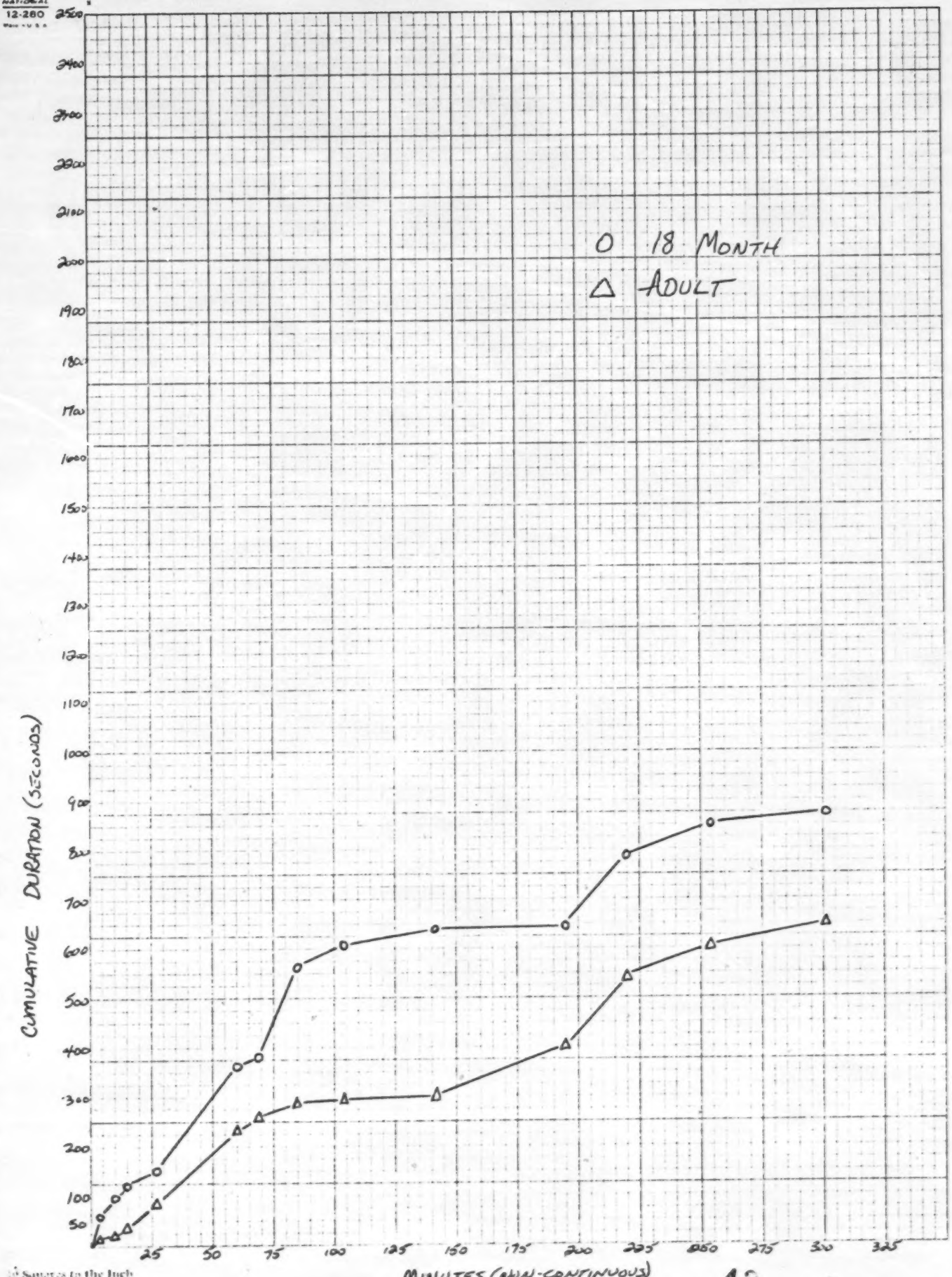
PILOT



10 Squares to the inch

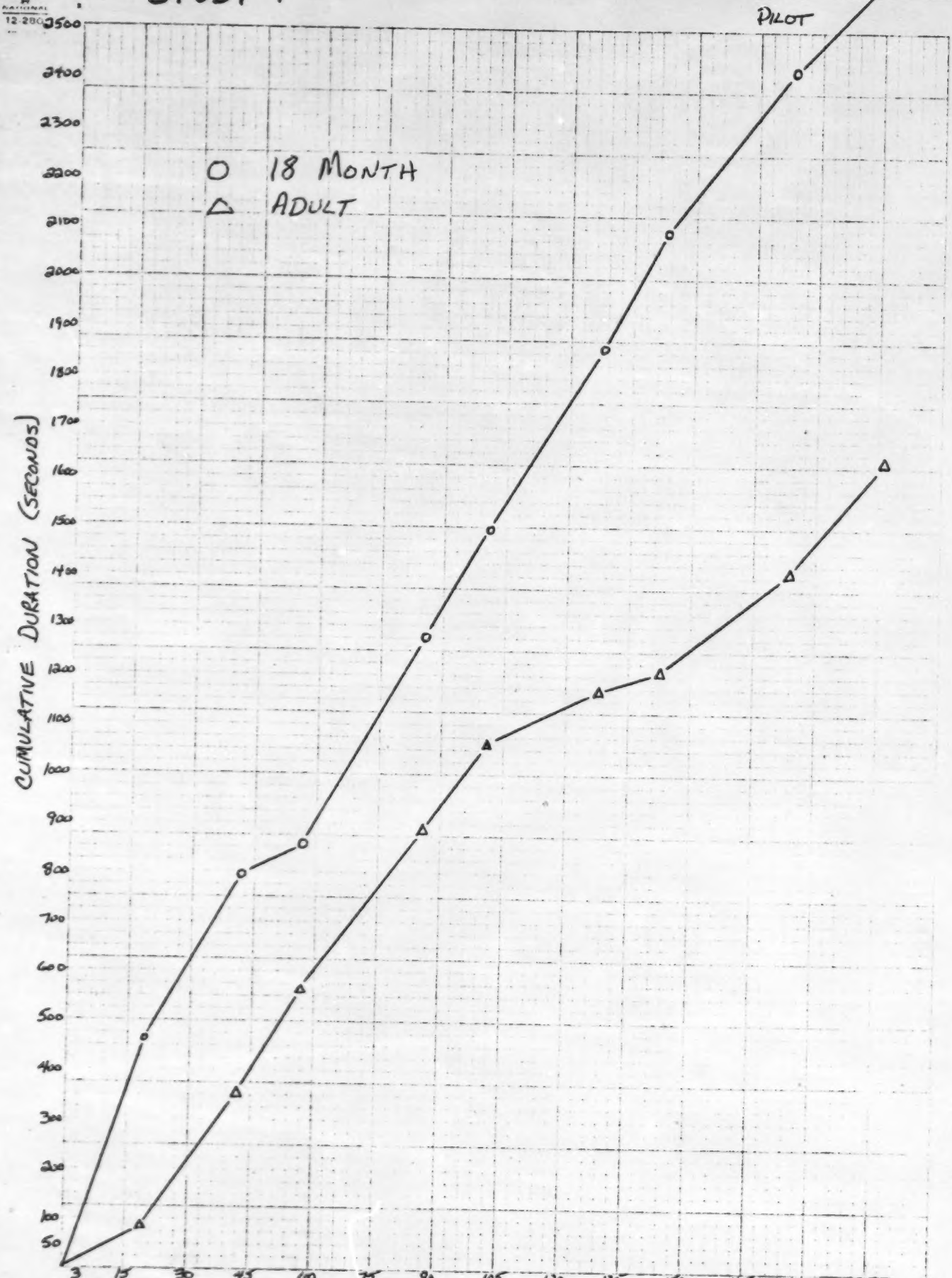
STUDY 1

PILOT



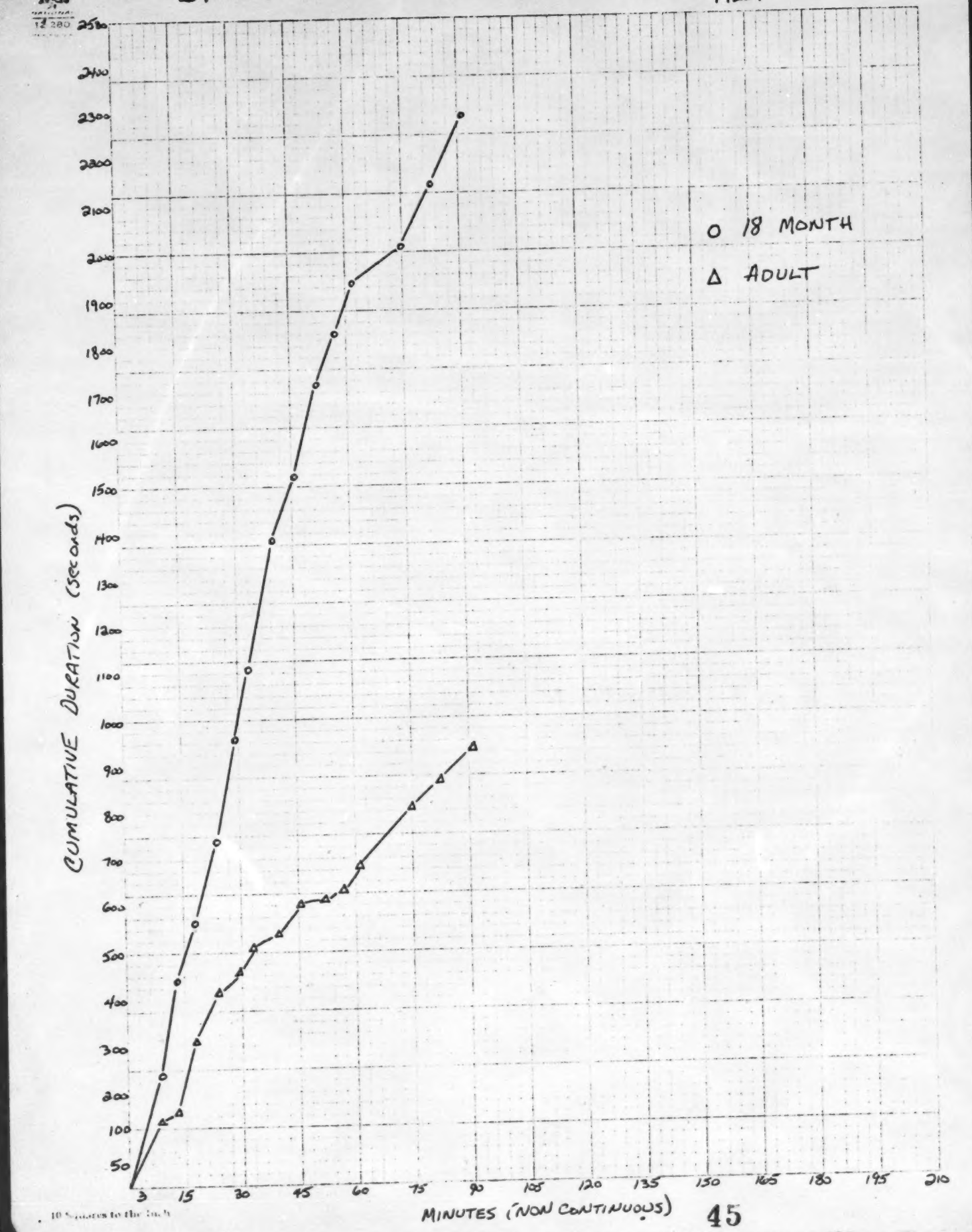
10 Squares to the Inch

STUDY 1


PILOT
○ 18 MONTH
△ ADULT
CUMULATIVE DURATION (SECONDS)
3500
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
50
3
15
30
45
60
75
90
105
120
135
150
165
180
195
210
MINUTES (NON CONTINUOUS)

STUDY 1

PILOT



APPENDIX 3

DATA SUMMARY

Child D-12 Age 12 months Dates 10/24/77 - 10/28/77
Sex male Voc Size Phase study 1
Birthdate MLU Occasion
Total Periods 232 Median Session Length 17 minutes

Feedback: 18 mo.

SUMMARY

duration/minute 1.1 dur/response 1.0
frequency 257 duration 253

Feedback: Adult

SUMMARY

duration/minute .9 dur/resp .9
frequency 250 duration 216

S	P	f	cf	d	cd	d/m	cd/m	d/r	cd/r	f	cf	d	cd	d/m	cd/m	d/r	cd/r	S	P
1	12	14	14	18	18	1.5	1.5	1.3	1.3	50	50	54	54	4.5	4.5	1.1	1.1	1	12
2	13	6	20	19	37	1.5	3.0	3.2	4.5	42	92	17	71	1.3	5.8	.4	1.5	2	13
3	21	126	146	86	123	4.1	7.1	.7	5.2	2	94	1	72	0	5.5	.5	2.0	3	21
4	16	24	170	25	148	1.6	8.7	1.0	6.2	4	98	2	74	.1	5.9	.5	2.5	4	16
5	21	5	178	4	152	.2	8.9	.5	6.7	3	101	18	92	.8	6.7	6.0	8.5	5	21
6	16	9	187	6	158	.4	9.3	.7	7.4	105	206	88	180	5.5	12.2	.8	9.3	6	16
7	24	9	196	35	193	1.4	10.7	3.5	11.2	4	210	1	181	0	12.2	.2	9.5	7	24
8	17	11	207	40	233	2.3	13.0	3.6	14.3	6	216	5	186	.3	12.5	.8	10.3	8	17
9	23	14	221	4	237	.2	13.2	.3	15.1	2	218	15	201	.6	12.8	7.5	17.8	9	23
10	20	10	231	1	238	0	13.2	.1	15.2	1	219	1	202	0	12.8	1.0	18.8	10	20
11	13	21	252	10	248	.5	14.0	.5	15.7	1	220	0	202	0	12.8	0	18.8	11	13
12	19	2	254	1	249	0	14.0	.5	16.2	24	244	8	210	4	13.2	3	19.1	12	19
13	17	3	257	4	253	.2	14.2	1.3	17.5	6	250	6	216	3	13.5	1.0	20.1	13	17
14																		14	
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DATA SUMMARY

Child D-15 Age 15 months Dates 11/7/77-11/10/77
Sex male Voc Size Phase Study 1
Birthdate MLU Occasion
Total Periods 49 Median Session Length 6 minutes

Feedback:

SUMMARY

duration/minute 10.1 dur/response 5.9
frequency 84 duration 496

Feedback: Advert

SUMMARY

duration/minute 7.5 dur/resp 3.9
frequency 94 duration 367

S	P	f	cf	d	cd	d/m	cd/m	d/r	cd/r	f	cf	d	cd	d/m	cd/m	d/r	cd/r	S	P
1	6	3	3	75	75	12.5	12.5	9.4	9.4	23	23	95	95	15.8	15.8	4.1	4.1	1	6
2	3	6	14	39	114	13.0	25.5	6.5	15.9	5	28	14	109	4.7	20.5	2.5	6.9	2	3
3	6	13	27	108	222	18.0	43.5	8.3	24.2	2	31	14	123	2.3	22.8	4.7	11.6	3	6
4	6	21	48	90	312	15.0	58.5	4.3	28.5	1	32	4	127	.7	23.5	4.0	15.6	4	6
5	9	14	62	29	341	3.2	11.7	.21	20.6	18	50	129	256	14.3	37.5	7.2	22.8	5	9
6	6	8	70	39	380	6.5	18.2	4.9	25.5	35	85	77	333	12.8	50.6	2.2	25.0	6	6
7	4	4	74	11	391	2.7	20.9	2.7	25.2	7	92	32	365	5.0	55.6	4.6	29.6	7	4
8	4	4	78	22	413	5.5	26.4	5.5	43.1	0	92	0	365	0	55.6	0	29.6	8	4
9	5	6	84	83	496	16.6	95.0	13.8	51.5	2	94	2	367	.4	56.0	1.0	30.6	9	5
10																		10	
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19																		19	
20																		20	

DATA SUMMARY

Child D-18 Age 18 months Dates 11/7/77-11/12/77
Sex Male Voc Size Phase Study 1
Birthdate MLU Occasion
Total Periods 202 Median Session Length 9.5 minutes

Feedback: 18mo.

SUMMARY

duration/minute 3.5 dur/response 4.2

frequency 168 duration 701

Feedback: Adult

SUMMARY

duration/minute 2.5 dur/resp 3.26

frequency 159 duration 517

S	P	f	cf	d	cd	d/m	cd/m	d/r	cd/r	f	cf	d	cd	d/m	cd/m	d/r	cd/r	S	P
1	9	5	8	22	22	2.4	2.4	2.7	2.7	6	6	36	36	4.0	4.0	6.0	6.0	1	9
2	8	13	21	41	63	5.1	7.5	3.1	5.8	14	20	27	63	3.4	7.4	1.9	7.9	2	8
3	7	0	24	1	64	.1	7.6	.3	6.1	10	30	1	64	.1	7.5	.1	8.0	3	7
4	9	1	25	0	64	0	7.6	0	6.1	3	33	5	69	.5	8.0	1.7	9.7	4	9
5	12	4	29	2	66	.2	7.8	.5	6.6	10	43	30	99	2.5	10.5	3.0	12.7	5	12
6	8	2	31	41	107	5.1	12.9	20.5	27.1	11	54	64	163	8.0	18.5	5.8	18.5	6	8
7	16	14	45	41	148	2.6	15.5	2.9	30.0	0	54	0	163	0	18.5	0	18.5	7	16
8	5	24	69	54	202	16.5	32.3	35	33.5	2	56	15	178	3.0	21.5	7.5	26.0	8	5
9	12	15	84	82	314	6.5	39.1	5.5	41.0	4	60	16	194	1.3	22.8	4.0	30.0	9	12
10	9	2	86	25	339	3.8	41.9	12.5	51.5	22	82	120	314	13.3	36.1	5.4	35.4	10	9
11	10	5	91	40	379	3.0	44.9	6.0	57.5	11	93	51	403	8.9	45.0	8.1	43.5	11	10
12	22	11	102	36	415	1.6	46.5	3.3	60.8	37	130	45	448	3.0	47.0	1.2	44.7	12	22
13	21	5	107	27	432	.9	47.4	5.4	66.2	10	140	38	486	1.3	48.3	3.8	48.5	13	29
14	46	61	168	28	701	5.8	53.2	4.4	70.6	19	159	31	517	.7	49.0	1.6	50.1	14	46
15																		15	
16																		16	
17																		17	
18																		18	
19																		19	
20																		20	

DATA SUMMARY

Child N-12 Age 12 months Dates 11/28/77-12/2/77
Sex male Voc Size Phase Study 1
Birthdate MLU Occasion
Total Periods 301 Median Session Length 18 minutes

Feedback: 18 mo.

SUMMARY

duration/minute .29 dur/response 2.8
frequency 309 duration 873

Feedback: Adult

SUMMARY

duration/minute 2.1 dur/resp 2.1
frequency 303 duration 649

S	P	f	cf	d	cd	d/m	cd/m	d/r	cd/r	f	cf	d	cd	d/m	cd/m	d/r	cd/r	S	P
1	4	29	71	66	66	16.5	16.5	2.3	2.3	14	14	15	15	3.7	3.7	1.1	1.1	1	4
2	6	29	58	33	99	5.5	22.0	1.1	3.4	11	20	6	21	1.0	4.7	.5	1.6	2	6
3	5	5	63	23	122	4.6	26.6	4.6	8.0	14	34	12	33	2.4	7.1	.8	2.4	3	5
4	12	14	77	28	150	2.3	25.0	2.0	10.0	44	83	48	81	4.0	11.1	1.1	3.5	4	12
5	32	55	132	21	361	6.6	35.5	3.8	13.8	54	137	149	230	4.6	15.7	.7	6.2	5	32
6	9	16	148	16	377	1.8	37.3	1.0	14.8	12	149	20	254	.2	17.9	1.7	7.9	6	9
7	18	34	182	183	560	10.4	47.7	5.5	20.3	11	160	32	286	1.8	19.7	.29	10.9	7	18
8	18	16	198	26	601	2.0	49.7	2.2	22.5	5	165	7	293	.4	20.1	1.4	12.2	8	18
9	38	23	221	38	639	1.0	50.1	1.6	24.1	4	169	3	296	.1	20.2	.7	12.9	9	38
10	53	14	235	6	645	.1	50.3	.4	24.5	55	224	106	402	2.0	22.2	1.9	14.5	10	53
11	24	50	285	144	789	6.0	56.5	2.9	27.4	32	256	143	545	5.9	25.1	4.5	19.3	11	24
12	35	10	295	63	852	1.5	58.6	6.3	33.7	29	285	61	606	1.7	28.5	2.1	21.4	12	35
13	47	14	309	21	873	4	61.0	1.5	35.2	18	303	43	649	.9	30.7	2.4	23.8	13	47
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20																		20	

DATA SUMMARY

Child N-15 Age 15 months Dates 11/14/77 - 11/18/77
Sex male Voc Size _____ Phase Study 1
Birthdate _____ MLU _____ Occasion _____
Total Periods 196 Median Session Length 22 minutes

Feedback: 18 mo.

SUMMARY

duration/minute 13.4 dur/response 3.5
frequency 760 duration 2637

S	P	f	cf	d	cd	d/m	cd/m	d/r	cd/r
1	19	197	617	463	463	24.4	24.4	2.3	2.3
2	23	121	315	333	796	14.5	38.9	2.7	5.0
3	15	38	256	57	552	3.8	42.7	1.5	6.5
4	29	87	443	422	1275	14.5	57.2	4.8	11.3
5	15	47	490	223	1498	14.9	72.1	4.7	16.0
6	27	97	537	305	1853	13.1	85.2	3.6	19.6
7	15	62	648	248	2098	16.3	101.5	3.9	23.5
8	31	73	722	326	2424	10.5	112.0	4.5	28.0
9	22	42	760	213	2637	9.7	121.7	5.1	33.1
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Feedback: Adult

SUMMARY

duration/minute 8.3 dur/resp 2.9
frequency 571 duration 1636

f	cf	d	cd	d/m	cd/m	d/r	cd/r	S	P
40	40	32	32	4.3	4.3	2.0	2.0	1	19
112	152	215	377	12.8	17.1	2.6	4.6	2	23
66	218	191	568	12.7	37.8	2.9	7.5	3	15
143	361	328	896	11.3	41.1	2.3	9.5	4	29
58	419	166	1062	11.1	52.2	2.9	12.7	5	15
28	447	110	1172	4.1	54.3	3.9	16.6	6	27
4	451	8	1180	.5	54.8	2.0	18.6	7	15
77	528	221	1401	7.4	64.2	3.0	21.6	8	31
43	571	227	1636	10.3	74.5	5.3	26.9	9	22
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DATA SUMMARY

Child N-18 Age 18 months Dates 11/14/77-11/18/77
Sex male Voc Size Phase Study 1
Birthdate MLU Occasion
Total Periods 91 Median Session Length 6 minutes

Feedback: 18 mo.

SUMMARY

duration/minute 25.1 dur/response 7.4

frequency 311 duration 2259

Feedback: Adult

SUMMARY

duration/minute 10.2 dur/resp 3.1

frequency 301 duration 933

S	P	f	cf	d	cd	d/m	cd/m	d/r	cd/r	f	cf	d	cd	d/m	cd/m	d/r	cd/r	S	P
1	9	18	18	243	343	27.0	27.0	13.5	13.5	39	39	146	146	16.2	16.2	3.7	3.7	1	9
2	4	14	32	203	446	50.7	77.7	14.5	28.0	2	41	31	177	5.2	21.4	10.5	14.2	2	4
3	5	5	37	136	582	25.2	102.9	25.2	53.2	23	64	154	331	30.8	52.2	6.7	20.9	3	5
4	6	9	46	170	752	28.3	131.2	15.1	72.1	24	95	69	420	16.5	68.7	2.9	23.8	4	6
5	4	16	62	154	936	46.0	177.2	11.5	83.6	11	109	43	463	10.7	79.4	3.9	27.7	5	4
6	5	49	111	178	1104	35.6	212.8	3.6	87.2	15	124	46	509	9.2	88.6	3.1	30.8	6	5
7	7	13	124	277	1381	30.6	243.4	21.3	108.5	13	137	30	539	4.3	92.9	2.3	33.1	7	7
8	6	10	134	143	1524	23.8	276.2	14.3	122.8	11	148	63	602	10.5	103.4	5.7	38.8	8	6
9	6	49	183	193	1717	32.2	308.4	3.9	126.7	3	151	4	606	.7	104.1	1.3	40.1	9	6
10	5	44	227	109	1826	21.5	330.2	2.5	129.2	10	161	24	630	4.8	108.9	2.4	42.5	10	5
11	5	18	245	101	1927	20.2	350.4	5.6	134.8	14	175	54	684	10.8	119.7	3.8	46.3	11	5
12	13	20	265	80	2007	6.1	356.5	4.0	138.8	69	244	130	814	10.0	129.7	1.9	48.2	12	13
13	8	5	273	141	2148	17.6	374.1	17.1	156.4	38	272	55	869	6.9	136.6	2.0	50.2	13	8
14	8	38	311	141	2289	17.6	391.7	3.7	160.1	29	301	64	933	8.0	144.6	2.2	52.4	14	8
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Consent Form

You are invited to participate in a study of normal and Down's syndrome children's listening preferences for different styles of speech. We hope to learn what those preferences are at different ages, and whether they correspond to the ways in which parents typically change their speech when talking to young children. We ultimately hope to learn how to better assist children with Down's syndrome in learning language.

You were selected as a possible participant in this study because your child is at the age we are interested in studying.

If you decide to participate, we will ask that you allow us to place the PLAYTEST equipment in your home for five days. Two plastic bottles will be attached to a playpen, and these bottle switches will be connected to a machine which records how your child plays with the bottles. Each bottle is connected to a tape recorder which will play pre-recorded speech whenever the bottles are moved. You will be asked to turn the machine on when you place your child in the playpen, and off after 20 minutes or when, for whatever reason, you must remove your child from the playpen. The number of times you will be asked to do this each day will depend on your daily schedule. You should know that this equipment has been safely used in a number of studies, and it has been designed so that children will enjoy playing with it.

Any information that is obtained in connection with this study, and that can be identified with you, will remain confidential and will be disclosed only with your permission. You will be reimbursed for any incidental costs connected with the study, for example, the electricity necessary for the equipment.

If you decide to participate, you are free to discontinue participation at any time without prejudice. If you have any questions, please ask us. If you have any additional questions later, Jim McCaul (224-6183) or Dr. Turnure (373-5210) will be happy to answer them.

You are making a decision whether or not to participate. Your signature indicates that you have read the information provided above and have decided to participate. You may withdraw at any time without prejudice after signing this form should you choose to discontinue participation in this study.

_____ _____

Signature Date

_____

Relationship to subject

_____

Signature of investigator

Listening Preferences Record

Date_____ Child_____

Session #_____ Phase_____

Initial Pair Order_____/_____
Left Right

Is Channel Position Switch on INVERTED ____

or NORMAL ____

Channel 1: DURATION_____ Channel 2: DURATION_____

RESPONSES_____ RESPONSES_____

PERIODS_____

Date_____ Child_____

Session #_____ Phase_____

Initial Pair Order_____/_____
Left Right

Is Channel Position Switch on INVERTED ____

or NORMAL ____

Channel 1: DURATION_____ Channel 2: DURATION_____

RESPONSES_____ RESPONSES_____

PERIODS_____